Massachusetts Military Reservation

Explanation of Significant Differences for Areas of Contamination CS-16/CS-17, SD-3/ FTA-3/CY-4, SD-4, and SD-5/FS-5

Final
August 2013

Prepared for:
AFCEC/MMR
Installation Restoration Program
322 East Inner Road
Otis ANGB, MA 02542

Prepared by:
Portage, Inc.
1075 S. Utah Ave., Suite 200
Idaho Falls, ID 83402

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ACRONYMS AND ABBREVIATIONS

ABB-ES	ABB Environmental Services, Inc.
AFCEC	Air Force Civil Engineering Center
AFCEE	Air Force Center for Environmental Excellence (pre-June 2007)/Air Force Center for Engineering and the Environment (post-June 2007)
ANG	Air National Guard
AOC	area of contamination
ASG	Automated Sciences Group
AVGAS	aviation gas
bgs	below ground surface
BSVR	biosparging and soil vapor recovery
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CMR	Code of Massachusetts Regulations
COC	contaminant of concern
CS	chemical spill
CSA	Central Storage Area
CY	coal yard
DDT	dichlorodiphenyltrichloroethane
DSR	data summary report
DSRP	Drainage Structure Removal Program
ECC	Environmental Chemical Corporation
EPA	U.S. Environmental Protection Agency
EPH	extractable petroleum hydrocarbons
ERA	ecological risk assessment
ESD	explanation of significant differences

FS	fuel spill
FTA	Fire Training Area
GPS	Global Positioning System
HAZWRAP	Hazardous Waste Remedial Action Program
HEC	hazard equivalent concentration
HI	hazard index
HLA	Harding Lawson Associates
IRP	Installation Restoration Program
LF	landfill
LTM	long-term monitoring
LUC	land use control
MADEP	Massachusetts Department of Environmental Protection
MCP	Massachusetts Contingency Plan
mgd	million gallons per day
MMR	Massachusetts Military Reservation
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NDIL	Nondestructive Inspection Laboratory
NGB	National Guard Bureau
OU	operable unit
OWS	oil/water separator
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
PFSA	Petroleum Fuel Storage Area
ppb	parts per billion

PRA	preliminary risk assessment
QC	quality control
RAH	Risk Assessment Handbook
RAL	remedial action level
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RI	remedial investigation
ROD	record of decision
RSL	regional screening level
SARAP	Source Area Remedial Action Program
SD	storm drain
SERA	screening-level ecological risk assessment
SI	site investigation
STCL	soil target cleanup level
STP	sewage treatment plant
SVE	soil vapor extraction
SVOC	semivolatile organic compound
TCE	trichloroethylene
TCL	target compound list
TCLP	Toxicity Characteristic Leaching Procedure
TMB	trimethylbenzene
TN&A	TN and Associates
TPH	total petroleum hydrocarbons
USAF	U.S. Air Force
USC	United States Code

USCG	U.S. Coast Guard
UST	underground storage tank
UU/UE	unlimited use/unrestricted exposure
UVF	ultraviolet fluorescent
VOC	volatile organic compound
VPH	volatile petroleum hydrocarbons

1.0 INTRODUCTION

This explanation of significant differences (ESD) has been prepared to document changes to the selected remedy for areas of contamination (AOCs) in the Source Area Remedial Action Program (SARAP). The AOCs addressed under this ESD are part of the Otis Air National Guard (ANG) Installation Restoration Program (IRP) at the Massachusetts Military Reservation (MMR). These AOCs consist of the following:

- Chemical Spill No. 16 (CS-16)/Chemical Spill No. 17 (CS-17)
- Storm Drain No. 3 (SD-3)/Fire Training Area-3 (FTA-3)/Coal Yard No. 4 (CY-4)
- Storm Drain No. 4 (SD-4)
- Storm Drain No. 5 (SD-5)/Fuel Spill No. 5 (FS-5)

This ESD modifies the following decision documents:

- *Record of Decision, Area of Contamination CS-16/CS-17 Source Areas,* Final, May 1999 (Air Force Center for Environmental Excellence [AFCEE] 1999).
- *Record of Decision, Areas of Contamination FTA-2/LF-2, PFSA/FS-10/FS-11, SD-2/FS-6/ FS-8; SD-3/FTA-3/CY-4, SD-4, and SD-5/FS-5 Source Areas*, Final, September 1998 (AFCEE 1998).
- *Explanation of Significant Differences to the Final Record of Decision, Areas of Contamination FTA-2/LF-2, PFSA/FS-10/FS-22, SD-2/FS-6/FS-8, SD-3/FTA-3/CY-4, SD-4, and SD-5/FS-5 Source Areas*, Final, October 2000 (AFCEE 2000a).
- *Explanation of Significant Differences Areas of Contamination, CS-10 (A, B & E), CS-16/CS-l7, FS-9, SD-2/FS-6/FS-8, and SD-3/FTA-3/CY-4*, Final, January 2003 (AFCEE 2003a).

Specific changes to the selected remedies presented in the decision documents listed above include the following:

- Establishment of new surface soil remedial action levels (RALs) for several contaminants of concern (COCs) and for contaminants not considered COCs in the RODs

- Removal of the asphalt-batching component from the selected remedy for AOC SD-5/FS-5

- Implementation of a soil vapor extraction (SVE) system to treat trichloroethylene (TCE) and tetrachloroethene (PCE) in subsurface soil at SD-5 Detail A

- Expansion of offsite disposal options for excavated soil from AOC SD-5/FS-5 to include Resource Conservation and Recovery Act (RCRA) Subtitle D facilities (42 *United States Code* [USC] § 6901 et seq.)

The MMR is a National Priorities List site under CERCLA. The Comprehensive Environmental Response, Compensation, and Liability Identification System (CERCLIS) number for the site is MA2570024487.

1.1 Statement of Purpose

This ESD was developed in accordance with §117(c) of CERCLA and 40 *Code of Federal Regulations* (CFR) § 300.435(c)(2)(1) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), which require the publication of an ESD to describe the significant difference(s) between the selected remedial action and the modified remedial action, including an explanation of why such changes were made. The format of the ESD is in accordance with the U.S. Environmental Protection Agency's (EPA's) *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents* (EPA 1999).

The Director of the AFCEC, U.S. Air Force, and the Director of the Office of Site Remediation and Restoration, EPA New England Region, have been delegated the authority to approve this ESD. The ESD will become part of the Administrative Record for the six AOCs addressed, in accordance with the NCP [40 CFR § 300.825(a)(2)]. The Administrative Record is available for public review at the AFCEC IRP Office (322 East Inner Road, Otis ANG Base, Massachusetts, 02542) Monday–Friday, 8 a.m.–4 p.m., excluding federal and state holidays.

1.2 Authorizing Signatures

The following signatures represent the decision to authorize this ESD.

Air Force Civil Engineer Center

Joe Sciabica
Director

23 Sep 2013
Date

U.S. Environmental Protection Agency

Nancy Barmakian for

James T. Owens, III
Director
Office of Site and Restoration

09/30/13
Date

2.0 SITE HISTORY, CONTAMINATION, AND SELECTED REMEDY

This section presents background information on the CS-16/CS-17, SD-3/FTA-3/CY-4, SD-4, and SD-5/FS-5 source areas, including an overview of the physical and chemical characteristics, history, and selected remedies for these source areas.

2.1 Site Location and Description

The MMR is located on western Cape Cod in Barnstable County, Massachusetts, approximately 60 miles south of Boston and immediately southeast of the Cape Cod Canal (see Figure 2-1). MMR occupies approximately 22,000 acres within the towns of Bourne, Falmouth, Mashpee, and Sandwich. The MMR is organized into the following four principal functional areas:

- Range Maneuver and Impact Area. This 14,000-acre area occupies the northern 70% of MMR and is used for training and maneuvers.

- Cantonment Area. Occupying 5,000 acres in the southern portion of MMR, this area is the location of administrative, operational, maintenance, housing, and support facilities for the base. This is the most actively used section of the MMR. Otis ANG Base, Camp Edwards, and Air Station Cape Cod all operate facilities, including the flightline area operated by Air Station Cape Cod (U.S. Coast Guard), which are located in the southeast portion of the Cantonment Area.

- Massachusetts National Cemetery. This area consists of 750 acres along the western edge of the MMR and contains the Department of Veterans Affairs cemetery and support facilities.

- Cape Cod Air Force Station. This area occupies 101 acres of the northern portion of the Range Maneuver and Impact Area and consists of a fixed-base, phased-array warning system known as PAVE PAWS.

2.2 Land Use and Site History

Although military activity began at MMR as early as 1911, most operations have occurred since 1935 and have consisted of two general types: (1) mechanized Army training and maneuvers and (2) military aircraft operations, maintenance, and support.

Intensive Army activity occurred with the onset of World War II and continued through demobilization following the war (1940 to 1946). Major aircraft operations associated with surveillance and air defense occurred from 1955 to 1970. Although aircraft operations continue today, the greatest potential for release of contaminants to the environment was between 1940 and 1970. Tenants at MMR include, or have included, the U.S. Coast Guard (USCG) (Air Station Cape Cod), Army National Guard (Camp Edwards), U.S. Air Force (USAF) (Cape Cod Air Force Station), ANG (Otis Air National Guard Base), Veterans Affairs National Cemetery, U.S. Marine Corps, U.S. Department of Agriculture, and the Commonwealth of Massachusetts.

Activities at MMR that have the potential for contaminating the environment have included the storage, handling, and disposal of solvents and petroleum fuels as well as the leakage of these materials into stormwater drainage systems and the sanitary sewer system. Landfill operations, firefighter training, coal and ash storage, and numerous chemical and fuel spills have also resulted in environmental contamination.

FIGURE 2-1 MMR LOCATION MAP.

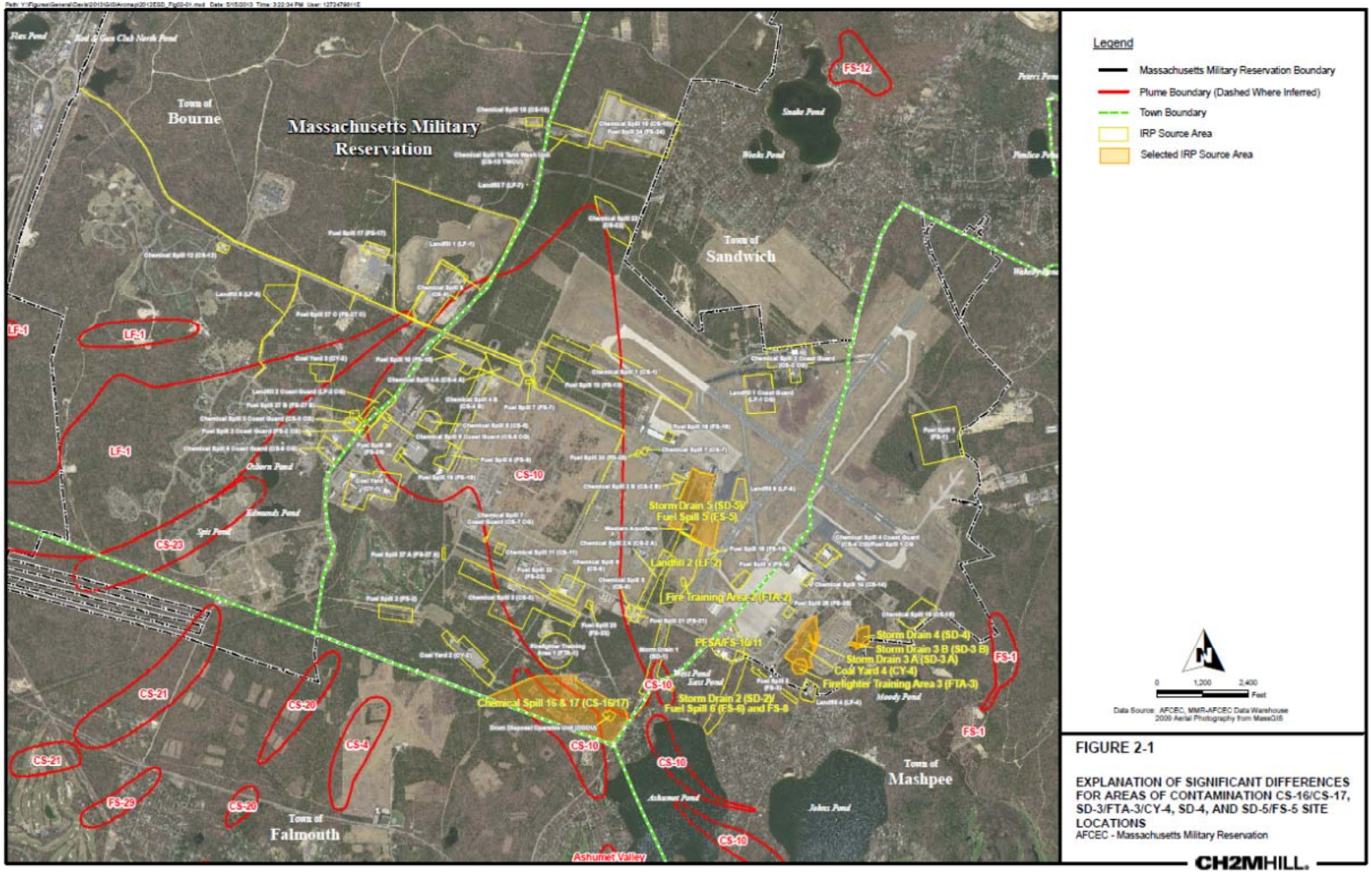


FIGURE 2-1

EXPLANATION OF SIGNIFICANT DIFFERENCES FOR AREAS OF CONTAMINATION CS-16/CS-17, SD-3/FTA-3/CY-4, SD-4, AND SD-5/FS-5 SITE LOCATIONS
AFCEC - Massachusetts Military Reservation

CH2MHILL

The following subsections provide background information, including land use and site histories, on the sites encompassed by this ESD.

2.2.1 CS-16/CS-17

AOC CS-16/CS-17 occupies approximately 80 acres along the southern boundary of the Cantonment Area near the Falmouth Gate and is located within the town of Sandwich, near the intersection of the Falmouth-Mashpee town lines (Figure 2-1). The source areas at AOC CS-16/CS-17 addressed in this ESD are the active and inactive sludge drying beds and the former sewage sludge disposal area. The locations of these sites are illustrated in Figure 2-2. Significant historical events include the following:

- 1936: A 0.9-million-gal-per-day (mgd) primary wastewater treatment facility was constructed at the current location of AOC CS-16/CS-17 to serve the MMR.

- 1941: A 3-mgd secondary wastewater treatment facility replaced the primary facility at the same location. Major treatment system components included two Imhoff tanks, two high-rate trickling filters, two secondary clarifiers, 24 sand filter beds, and 22 sludge drying beds. Waste battery electrolyte, cleaners, solvents, and paint thinners from various MMR operations were reportedly discharged to this sanitary sewer, and it is assumed that metals and organic chemicals contained in these waste materials partitioned to organic matter concentrated in the treatment sludge. Although some chemicals may have volatilized to the atmosphere during the treatment process, others may have passed through the former sewer treatment plant (STP) and discharged to the final effluent.

- Before 1960s: Reportedly, tank-bottom sludge from JP-4 jet fuel, heating oil, and aviation gasoline (AVGAS) tanks was placed in the sludge drying beds.

- 1995: The ANG upgraded the former STP to discharge effluent to new sand filter beds near the Cape Cod Canal. A 14-mile pipeline, a pumping station, and associated basins at the former STP and sand filter beds near the Cape Cod Canal were constructed. Discharge to the onsite active sand filter beds has been discontinued. The upgraded former STP began operation in 1995.

- 1996: Sludge remaining in the Imhoff tanks was removed and treated before demolition.
- 1997: Demolition of the former STP concrete structures was completed.

The following investigations and remedial actions were conducted at AOC CS-16/CS-17:

- 1983–1985: The U.S. Geological Survey conducted a groundwater survey identifying the existence of a groundwater plume in Ashumet Valley.
- 1987: The former STP and off-reservation groundwater study included multimedia sampling to evaluate former STP activities possibly related to the Ashumet Valley groundwater plume.
- 1987–1989: A site investigation (SI) that included soil and groundwater sampling was conducted.
- 1994: A remedial investigation (RI) was conducted; soil and groundwater sampling, nature and extent characterization, fate and transport of contamination, and risk assessment were included.
- 1998: A feasibility study was completed to evaluate remedial alternatives to mitigate risk resulting from concentrations of contaminants in soil.

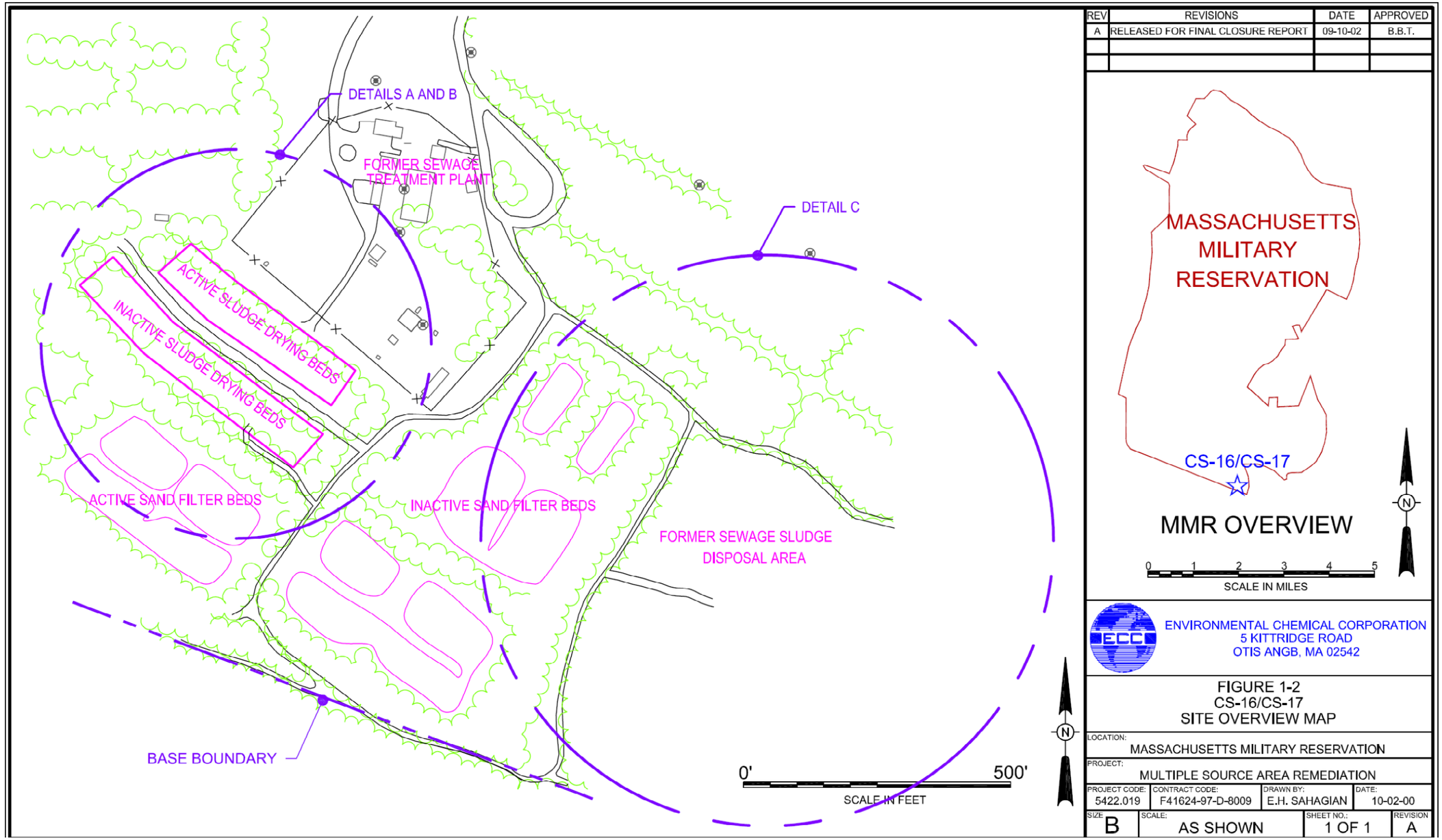


FIGURE 2-2 CS-16/CS-17 OVERVIEW.

- 2000–2001: Surface and subsurface soil delineation sampling was conducted to determine the boundaries of soil excavation based on remedial action levels (RALs).

- 2001–2002: Excavation, confirmation sampling, and site restoration activities were conducted at AOC CS-16/CS-17.

2.2.2 SD-3/FTA-3/CY-4

AOC SD-3/FTA-3/CY-4 is located near the southeastern border of the MMR in a moderately industrialized area on the eastern side of the runways, covering approximately 30 acres (Figure 2-1). The source areas of AOC SD-3/FTA-3/CY-4 addressed in this ESD are illustrated in Figure 2-3. The majority of the AOC is bordered by Granville Avenue on the west and the ANG Ammunition Storage Area on the east. A small portion of SD-3 is located east of the ammunition storage area. The SD-3 stormwater drainage ditch receives runoff from this area and the eastern edge of the aircraft maintenance ramp, the former Central Heating Plant, and associated stockpiles of coal and surficial coal ash. FTA-3 was located in an area where construction debris and coal ash were disposed of after construction of the Central Heating Plant in 1955.

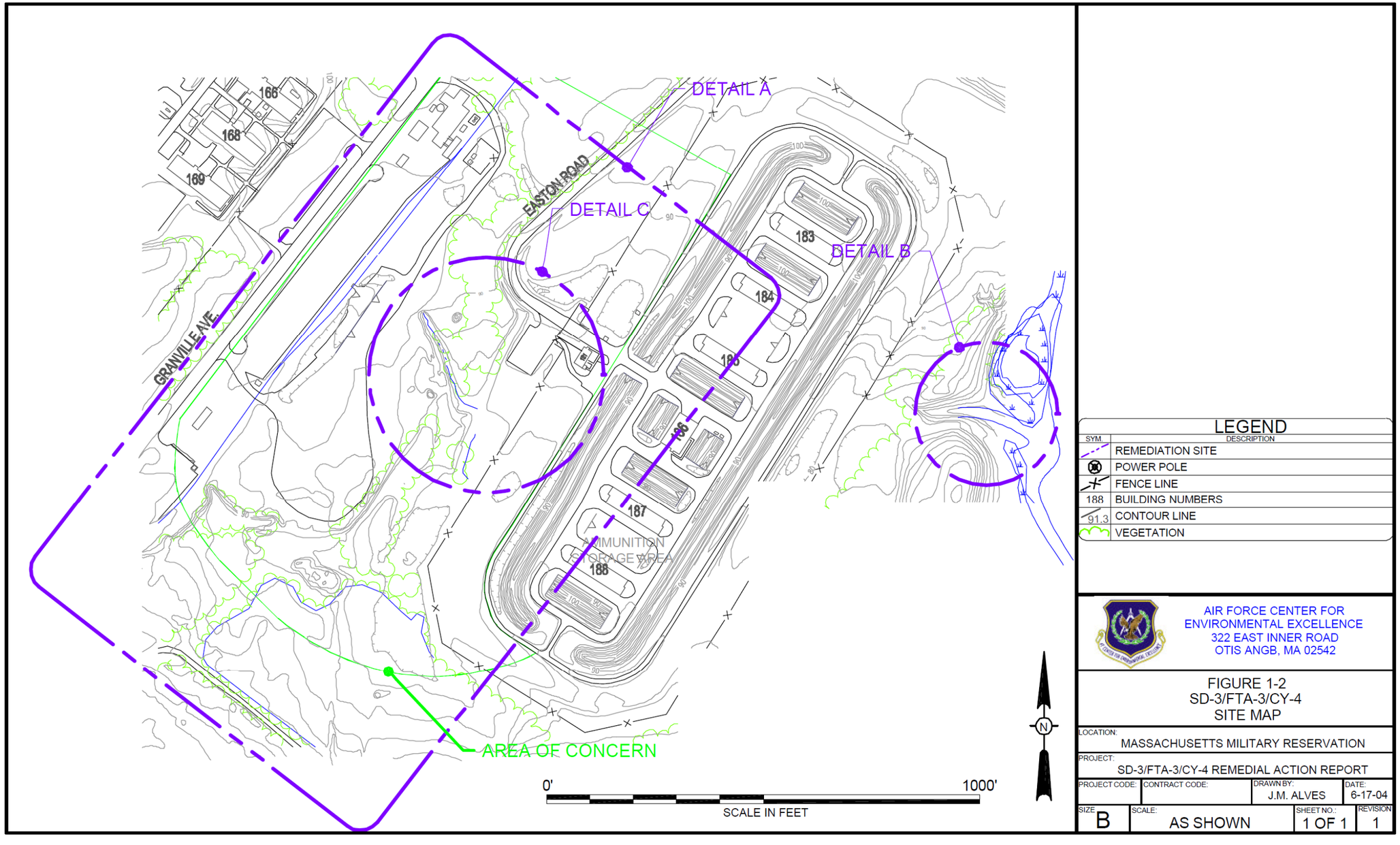


FIGURE 2-3 SD-3/FTA-3/CY-4 OVERVIEW.

AOC SD-3/FTA-3/CY-4 is located within the fenced flightline security area. Access to areas within the flightline area is controlled with fences and guard posts, and activities not related to aircraft operations are limited and strictly controlled. Fences around the flightline areas are inspected daily by base security. These site access restrictions are expected to remain in place through the duration of the current lease (expiration date of 2026) and the planned 25-year renewal. Significant historical events include the following:

- 1950s: The SD-3 drainage ditch was constructed to receive the discharge from storm drains serving aircraft hangars and several streets west of Granville Avenue and the discharge from the Central Heating Plant.

- 1955–1978: Coal was stockpiled directly on the ground prior to installation of a concrete storage pad.

- 1955–1992: The coal ash disposal area received coal ash and fly ash from the Central Heating Plant.

- 1956–1958: FTA-3 was used for firefighter-training exercises. Subsequent to firefighter-training activities, the site was backfilled with construction debris, fill, and coal ash.

The following investigations and remedial actions were conducted at AOC SD-3/FTA-3/CY-4:

- 1987: An SI was performed to assess the presence of contamination in surface water, sediment, soil, and groundwater at this AOC.

- 1989: An RI was performed to characterize the nature and distribution of sediment, soil, and groundwater contamination and evaluate site risks.

- 1993: A supplemental RI was performed to further characterize sediment contamination and evaluate potential risks.

- 1994: The National Guard Bureau, with the concurrence of EPA and MADEP, excavated coal, coal ash, and potentially contaminated soils from CY-4 and FTA-3 for use as subgrade fill during final capping of the main base landfill (LF-1). A total of 42,000 yd^3 of material, representing the majority of coal and coal ash at CY-4, was excavated to depths

of up to 15 ft. Additionally, soils at the FTA-3 location were also removed. This excavation was then backfilled with clean fill and covered with wood chips, restoring the land surface to approximately the original grade.

- 1997: A feasibility study was performed to evaluate approaches to control potential site risks.

- 2001: Surface and subsurface soil delineation sampling was conducted to determine the boundaries of soil excavation based on RALs.

- 2001–2002: Excavations of contaminated soil were conducted at AOC SD-3/FTA-3/CY-4 Detail A and B sites. Confirmation samples were collected, and restoration activities were conducted after excavation of each site.

2.2.3 SD-4

AOC SD-4 is a wooded drainage basin located in the southeastern section of MMR and extends from the flightline security area immediately east of Hangar 124 approximately 3,500 ft south toward Johns Pond (Figure 2-1). The source areas of AOC SD-4 addressed in this ESD are illustrated in Figure 2-4. The drainage basin, which became operational in 1950, received stormwater drainage from storm sewers that lead from Hangars 158, 128, 126, and 124, including the buildings, runways, ramps, and decks that serve the four hangars in addition to the former Building 123 pumphouse area. The drainage basin also reportedly received flow from numerous spills and liquids disposal during daily operations at these facilities. Significant historical events include the following:

- 1968: An OWS was constructed in the drainage basin south of Reilly Road.

- 1955–1970: Hangar 128 was used to maintain 18 to 21 aircraft. During that time, known quantities of solvents were released into the storm drain system.

- 1978–1988: Hangar 126 was used by the USCG for aircraft maintenance. Periodic heating of the wing tanks of the aircraft resulted in numerous spills of AVGAS to the hangar deck; a portion of it was washed into the storm drain system.

- 1978: A spill of approximately 1,000 gal of AVGAS occurred outside the hangar; it was also flushed into the storm drain system.

The primary environmental concerns at AOC SD-4 were the effects of chemical releases on surface soil, subsurface soil, surface water, and groundwater. It was estimated that approximately 0.5 million to 1.4 million gal of petroleum distillate solvents was released to the SD-4 stormwater drainage system from Hangar 158. These solvents, used in daily operations at support shops located in the hangar, were reportedly dumped into hangar deck drains connected to the storm drain system.

The following investigations and remedial actions were conducted at AOC SD-4:

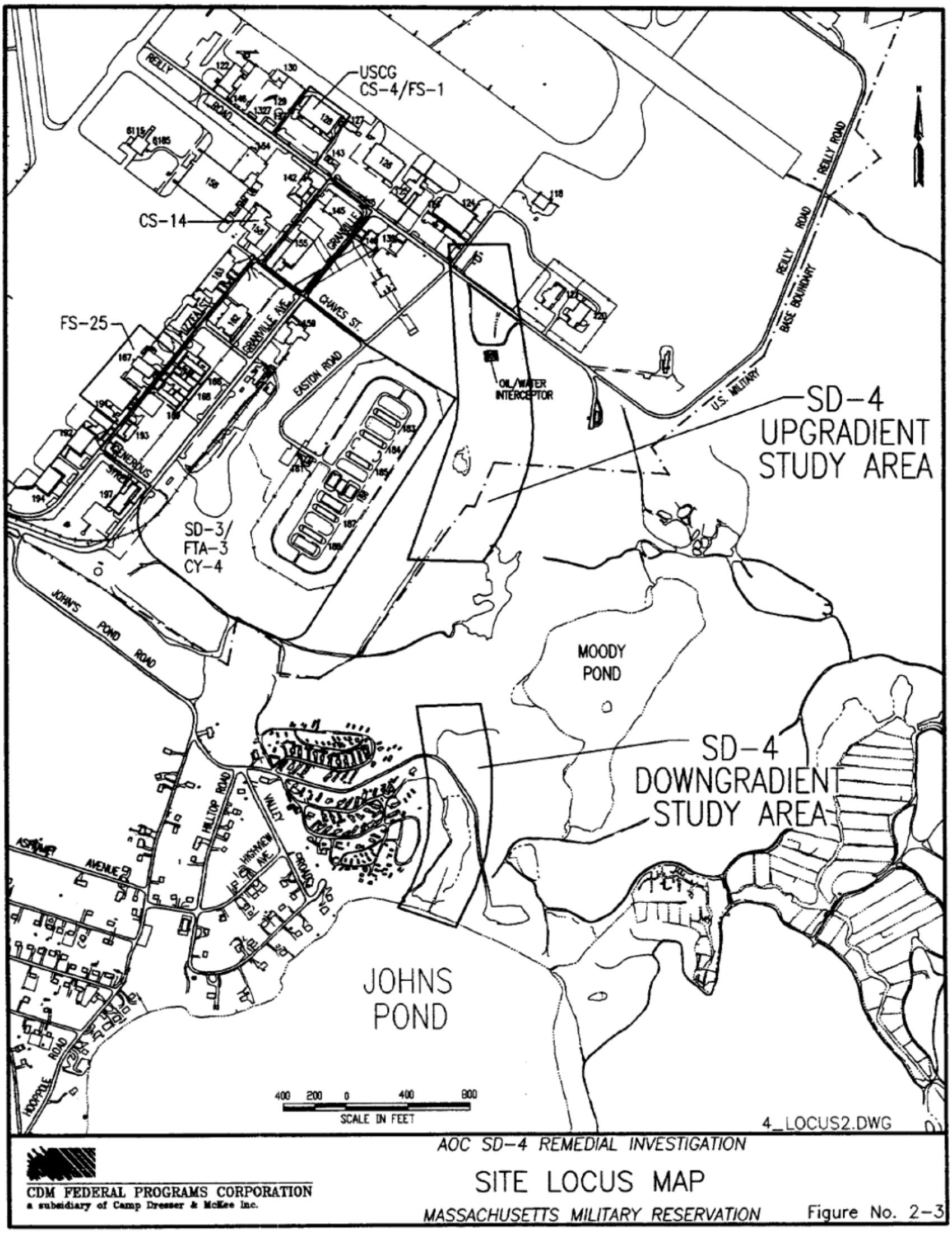
- 1989–1991: An SI and a supplemental SI were performed to characterize the nature and distribution of sediment, soil, and groundwater contamination.

- 1993–1994: An RI was performed to characterize the nature and distribution of sediment, soil, surface-water, and groundwater contamination and evaluate site risks.

- 1999: As a pre-excavation sampling event, soil sampling was conducted in the drainage ditch north of Reilly Road to confirm the presence or absence of total petroleum hydrocarbon (TPH) contamination in soils at levels above soil target cleanup levels (STCLs). Concurrently, surface-water and sediment samples were collected at an upgradient pond/wetland area (south of Reilly Road).

- 2001–2002: Surface water and sediment were sampled for ecological evaluation of a pond/wetland structure south of Reilly Road.

FIGURE 2-4 SD-4 OVERVIEW.



- 2002–2003: A screening-level ecological risk assessment and an ecological risk assessment were conducted to evaluate potential risks posed by inorganic constituents in hydric soils at the SD-4 wetland structure south of Reilly Road.

- 2009: A groundwater sampling event was performed to determine whether or not residual concentrations of isomers of TMB remain in groundwater immediately downgradient from the former location of Building 123 pumphouse and associated underground storage tanks (USTs).

2.2.4 SD-5/FS-5

AOC SD-5/FS-5 is located in the central part of the MMR Cantonment Area between North Inner Road and Lingley Avenue on the north and south, respectively, and Base Runway No. 5 on the east, approximately 3,000 ft from the southern MMR boundary (Figure 2-1). The source areas of AOC SD-5/FS-5 addressed in this ESD occupy approximately 40 acres at the north end of a natural drainage swale that formerly extended southward for more than 10,000 ft toward Ashumet Pond (Figure 2-5). The Central Drainage Swale at AOC SD-5/FS-5 receives stormwater runoff from approximately 100 acres of paved runways and ramps through an extensive stormwater drainage system. The swale is unlined, and water that does not evaporate or infiltrate flows south to an unlined 1-acre stormwater infiltration basin.

Possible contamination sources near SD-5 include an aircraft maintenance ramp, two UST/transfer systems (Aquafarms), the Nondestructive Inspection Laboratory (NDIL), and the Corrosion Control Shop. Significant historical events include the following:

- 1950s: SD-5 began receiving stormwater runoff from a number of sources, including the Eastern and Western Aquafarms, the former NDIL, the Corrosion Control Shop, and the Permanent Field Training Site hangar.

- Early 1960s: Three refueling aircraft were destroyed in a fire, resulting in the FS-5 fuel spill of up to 15,000 gal of AVGAS. The spill was washed into the storm drain.

- 1994: The NDIL and Corrosion Control Shop were demolished and removed. Two 12,000-gal USTs were removed from the Aviation Lubricating Oil (AVLUBE) area as part of the Fuel System Upgrade Program.

- 1994–1995: A total of 17 USTs, including all six 25,000-gal tanks at the Western Aquafarm, all four 25,000-gal tanks at the Eastern Aquafarm, and seven 550-gal tanks associated with water separator control pits, were removed.

- 1996: The NDIL leaching well and surrounding soil were removed as part of the Drainage Structure Removal Program (DSRP).

The following investigations and remedial actions were conducted at AOC SD-4:

- 1988: An SI was performed to assess the presence of soil and groundwater contamination.

- 1989: An RI was performed to characterize the nature and distribution of sediment, soil, and groundwater contamination.

- 1993: A supplemental RI was performed to further characterize contamination and evaluate site risks.

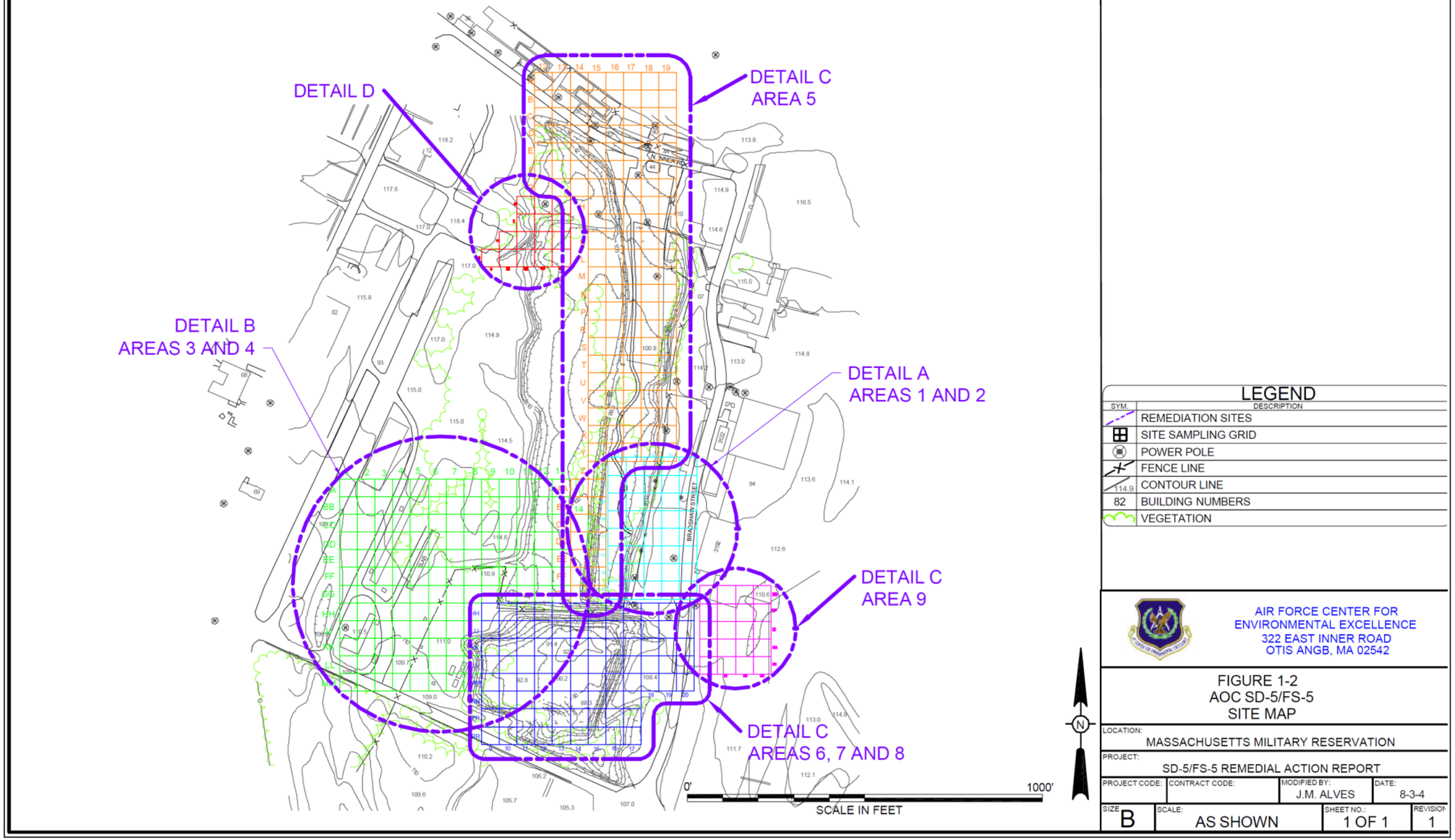


FIGURE 2-5 SD-5/FS-5 OVERVIEW

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- 2000–2001. Surface and subsurface soil delineation sampling was conducted to determine the boundaries of soil excavation based on RALs.

- 2001: Excavation and removal- and confirmation-sampling activities occurred at SD-5 Detail B, Areas 3 and 4; SD-5 Detail C, Area 5; SD-5 Detail C, Areas 6, 7, and 8; Detail C, Area 9; and Detail D.

- 2002–2003: SVE began operation at SD-5 Detail A on August 20, 2002, and completed operation and was shutdown on August 14, 2003.

- 2004: Additional excavations were performed at SD-5 Details A and B.

2.3 Selected Remedy

This subsection describes the remedies that AFCEE originally committed to in the ROD for each AOC and additional information regarding changes to the remedies selected in the ROD, as applicable, resulting from the 2000 and/or 2003 ESDs (AFCEE 2000a; AFCEE 2003a).

2.3.1 ROD CS-16/CS-17 Source Areas, Final, May 1999

The selected remedy for CS-16/CS-17 was excavation, asphalt batching, onsite treatment, and offsite disposal. The major components of this remedy were excavation and onsite cold-mix asphalt batching of recyclable contaminated surface soils, with excavation and offsite disposal of nonrecyclable contaminated surface soils. This source control action was designed to address the principal threat at AOC CS-16/CS-17: the contamination of surface soils by organic compounds, pesticides/polychlorinated biphenyls (PCBs), and inorganic compounds at concentrations that pose an unacceptable risk to terrestrial ecological receptors through food-chain exposures. Because the remedy was a source area remedial action, it did not include a groundwater migration management component; however, groundwater monitoring annually for 5 years was included. Groundwater contamination beneath and downgradient of AOC CS-16/CS-17 was addressed as part of the Ashumet Valley groundwater plume cleanup.

Excavated source area soils that were determined to exceed Toxicity Characteristic Leaching Procedure (TCLP) allowable concentrations and therefore deemed hazardous were disposed of

offsite in a RCRA Subtitle C treatment, storage, and disposal facility. Soils and sediments that were determined to be below TCLP allowable concentrations and therefore nonhazardous (and that were determined to contain contaminant concentrations below MADEP MCP Method 1 S-l/GW-1 standards for pesticides and Massachusetts Permitted Soil Recycling Facility Summary Levels) would have been treated at the onsite cold-mix emulsion asphalt-batching plant.

2.3.2 ROD AOC FTA-2/LF-2, PFSA/FS-10/FS-11, SD-2/FS-8, SD-3/FTA-3/CY-4, SD-4, and SD-5/FS-5 Source Areas, Final, September 1998

2.3.2.1 AOC SD-3/FTA-3/CY-4. The selected remedy for AOC SD-3/FTA-3/CY-4 is confirmation sampling with contingency of excavation and asphalt batching. This alternative included institutional and engineering controls to assess the adequacy of previous removal actions, limit exposure to site-related contaminants, and, if necessary, remove source-area soils exceeding cleanup criteria and treat the soils to reduce contaminant mobility. The risk assessment did not identify the need to clean up groundwater at this AOC; consequently, the remedy did not include a management-of-migration component.

2.3.2.2 AOC SD-4. The selected remedy for AOC SD-4 was excavation and asphalt batching. This alternative included institutional and engineering controls for areas north of Reilly Road to limit exposure to site-related contaminants in soil and to reduce source-area soil contaminant concentrations to protective levels. For areas south of Reilly Road, this alternative provided sampling and engineering controls to assess the contribution of sediment contaminants to surface-water contamination, the potential bioavailability and toxicity of pond sediments, and, if necessary, removal of source-area sediments exceeding cleanup criteria (ROD did not specify a cleanup level) and treatment of excavated material to reduce contaminant mobility. The risk assessment did not identify the need to clean up groundwater at this AOC; consequently, the remedy did not include a management-of-migration component.

2.3.2.3 AOC SD-5/FS-5. The selected remedy for AOC SD-5/FS-5 was excavation and asphalt batching. This alternative included institutional and engineering controls to limit exposure to site-related contaminants and to reduce source-area contaminant concentrations to protective levels. The remedy did not include a management-of-migration component. Groundwater contamination attributed to AOC SD-5/FS-5 was addressed by the SD-5 North

Groundwater Plume Extraction, Treatment, and Reinjection System and the SD-5 South Recirculating Well System.

2.3.3 Final 2000 ESD, October 2000

The 2000 ESD (AFCEE 2000a) was prepared to document a change to the remedy selected for AOC SD-5 in the Six-AOC ROD (AFCEE 1998). The ESD added a drainage swale that had been considered part of the CS-2 Study Area to the horizontal footprint of AOC SD-5/FS-5 (Figure 2-5, shown as Detail D). In the process of preparing a draft decision document proposing "No Further Action" on the CS-2 (CDM Federal Programs Corporation [CDM] 1997), AFCEE noted that a drainage swale at CS-2 still contained elevated levels of contaminants above STCLs that were similar to those found within AOC SD-5. Because the horizontal extent of contamination at SD-5 was to be further delineated in 2000, and remediation was scheduled to follow this delineation effort, it was more practical to add the CS-2 drainage swale to the future delineation and remediation efforts at SD-5. In addition, the No Further Action decision document for CS-2 could be finalized immediately, because residual risk associated with the remainder of this study area was within regulatory limits. The other AOCs, including FS-5, were not affected by the 2000 ESD.

2.3.4 Final 2003 ESD, January 2003

The 2003 ESD (AFCEE 2003a) was prepared to document changes to the selected remedy for several sites in the SARAP, including sites covered under the CS-16/CS-17 ROD (AFCEE 1999) and the Six-AOC ROD (AFCEE 1998), including SD-2/FS-6/FS-8 and SD-3/FTA-3/CY-4. Four changes were made to the selected remedy presented in the two SARAP RODs:

- Establishment of RALs for certain inorganic chemicals, PCBs, and petroleum hydrocarbons to replace cleanup levels in the RODs (see Table 2-1)
- Removal of the asphalt-batching component from the selected remedies
- Expansion of offsite disposal options to include RCRA Subtitle D facilities

- Exercising the contingency remedy at AOC SD-3/FTA-3/CY-4 to include excavation and offsite disposal.

The changes listed above did not affect the selected remedy for SD-4 or SD-5/FS-5.

The 2003 ESD RALs for inorganic chemicals and petroleum hydrocarbons superseded the cleanup levels for identified COCs presented in SARAP controlling documents, which are based on STCLs used for the DSRP. The 2003 ESD incorporated the following changes:

- In 2000, AFCEE, with concurrence from EPA and MADEP, revised ecological risk-based STCLs for inorganic chemicals in a technical memorandum (AFCEE 2000b)

- In 2002, AFCEE revised phytotoxicity and invertebrate STCLs for several inorganics in an addendum to the technical memorandum (Portage 2002)

- AFCEE adapted the EPA screening level guidance for Superfund sites as the RAL for PCBs

- MADEP developed generic soil cleanup standards for the hydrocarbon fractions using the EPH/VPH analytical procedures (MADEP 1994).

The development of a RAL included a comparison of the revised terrestrial vertebrate receptor STCLs with the terrestrial plant STCL and terrestrial invertebrate STCL. The lowest STCL was then compared to the MMR-specific background. The higher of the two values was selected as the RAL protective of all ecological receptors. As a result of these changes to the CS-16/CS-17 ROD and the Six-AOC ROD, the 2003 ESD provided revised and new RALs for the COCs listed in Tables 2-1 and 2-2, respectively.

The 2003 ESD documents the removal of the asphalt batching component because of contaminated soils from SD-3/FTA-3/CY-4 and CS-16/CS-l7 not being amenable for asphalt batching due to physical and/or chemical properties (i.e., high organic content or contaminant concentrations greater than MADEP soil acceptance criteria for recycling facilities). The remaining volume of contaminated soils from SD-2/FS-6/FS-8 that could be asphalt batched did not justify the capital cost of an onsite asphalt batching unit.

The 2003 ESD also documents the decision to allow for flexibility in offsite soil disposal on the grounds that recent waste characterization efforts indicate that none of the contaminated soil excavated at AOCs SD-2/FS-6/FS-8, SD-3/FTA-3/CY-4, and CS-16/CS-17 addressed in the 2003 ESD was RCRA hazardous waste. Therefore, this material could be disposed of at RCRA Subtitle D facilities.

The selected remedy at AOC SD-3/FTA-3/CY-4 is confirmation sampling with the contingency of excavation and asphalt batching. The 2003 ESD documents the exercising of the excavation component of the contingency remedy. Evaluation of analytical data for this site indicated that the soil at this site is considered nonrecyclable and therefore shall be disposed of at an offsite disposal facility instead of being asphalt batched as the original contingency required.

Table 2-1 Summary of changes in cleanup levels and basis for selection in the 2003 ESD.

COC	SARAP ROD Cleanup Level (mg/kg)/Basis	2003 ESD RAL (mg/kg)/ Basis
Arsenic	3.6 (MMR background)	7.1 (Lowest ecological, mammal)
Cadmium	1.5 (MMR background)	1.8 (Lowest ecological, bird)
Chromium	6.8 (MMR background)	19.0 (Camp Edwards/MMR background)
Copper	19.3 (Lowest ecological, bird)	61.0 (Ecological, invertebrates)
Lead	15.8 (Lowest ecological, bird)	99.0 (MADEP background)
Mercury	1.46 (Lowest ecological, bird)	0.18 (Lowest ecological)
Vanadium	15.2 (MMR background)	47.0 (Lowest ecological)
Zinc	16.0 (MMR background)	68.0 (Lowest ecological)
PCBs	0.158 (Human health)	1.0 (EPA human health risk)
TPH[a]	500 (Outside the flightline, MCP S-1/GW-1)	1,000 (MCP S-1/GW-1)
a. See Table 2-2 for petroleum hydrocarbon fractions.		

Table 2-2 MCP S-1/GW-1 standards for petroleum hydrocarbons selected in the 2003 ESD.

COC	SARAP ROD Cleanup Level (mg/kg)/Basis	2003 ESD RAL (mg/kg)/Basis
C_5-C_8 Aliphatic hydrocarbons	Not identified	100 (MCP S-1/GW-1)
C_9-C_{12} Aliphatic hydrocarbons	Not identified	1,000 (MCP S-1/GW-1)
C_9-C_{18} Aliphatic hydrocarbons	Not identified	1,000 (MCP S-1/GW-1)
C_{19}-C_{36} Aliphatic hydrocarbons	Not identified	3,000 (MCP S-1/GW-1)
C_9-C_{10} Aromatic hydrocarbons	Not identified	100 (MCP S-1/GW-1)
C_{11}-C_{22} Aromatic hydrocarbons	Not identified	200 (MCP S-1/GW-1)

3.0 BASIS FOR THE EXPLANATION OF SIGNIFICANT DIFFERENCES

This ESD describes changes to the remedies for CS-16/CS-17, SD-3/FTA-3/CY-4, SD-4, and SD-5/FS-5. Changes include following:

- Establishment of new RALs for surface soil (0–2 ft below ground surface [bgs]) for some COCs and for contaminants not considered COCs in the RODs (discussed in Subsection 3.1)

- Removal of the potential sediment excavation requirement from the selected remedy at SD-4 (discussed in Subsection 3.2)

- Removal of the asphalt-batching component from the selected remedy of SD-5/FS-5 (discussed in Subsection 3.3)

- Implementation of an SVE system to treat TCE and PCE in subsurface soil at SD-5 Detail A (discussed in Subsection 3.4)

- Expansion of offsite disposal options for excavated soil from AOC SD-5/FS-5 to include RCRA Subtitle D facilities (discussed in Subsection 3.5)

The level of protection (i.e., risk reduction) that the remedies provide will not be impacted by the changes in the remedies.

The basis for each of the significant differences listed above is described below.

3.1 Establishment of New Surface Soil Remedial Action Levels

This ESD uses the same basis as the 2003 ESD for establishment of new surface soil RALs for inorganic and petroleum hydrocarbon COCs, i.e., RALs were selected through a systematic review of revised STCLs, phytotoxicity and invertebrate screening values, and background concentrations. Those RALs that are selected or changed through this ESD are discussed below, by COC. Those COCs not specifically identified below are adopted in this current ESD unchanged from the 2003 ESD.

Mercury – Mercury was historically found at the former sludge disposal area of (AOC CS-16/ CS-17 Detail C) at elevated levels (AFCEE 2003c). Because the historic samples were composites, the detected mercury levels were not used in the risk assessment and mercury was not identified as a COC in the ROD. However, delineation sampling included both total mercury and methyl mercury analysis to ensure that there were no unacceptable human and ecological risks remaining.

The intent of the total mercury and methyl mercury analysis was to determine whether or not the mercury present at the former sludge disposal area (CS-16/CS-17 Detail C) was the more toxic form of mercury (i.e., mono-methyl mercury) or elemental mercury. The mercury RAL for protection of ecological receptors is 0.18 mg/kg, which is based on the mono-methylated form. Delineation results indicated that mono-methyl mercury was present at trace concentrations, well below the MMR RAL; however, concentrations of total mercury exceeding the MADEP Landfill Reuse Level (10 mg/kg) were excavated due to the presence of other compounds exceeding the RALs (AFCEE 2003c). Approximately 3,286 cubic yards of contaminated soil was removed from CS-16/CS-17 Detail C either as excavated soil or removal of existing soil piles. Delineation sampling indicated approximately 70% of the contaminated soil included total mercury in excess of the 10 mg/kg reuse level.

Based on the historical investigations and remedial action activities, this ESD proposes to add mono-methyl mercury and total mercury as COCs and their associated RALs for AOC CS-16/CS-17. Adopting the new COCs and RALs does not change the protectiveness of the remedy.

Petroleum hydrocarbons – The cleanup level for TPH was amended by incorporating the most current MCP S-1/GW-1 standards for EPH/VPH. MADEP has re-evaluated MCP S-1/GW-1 standards since 2003. The new MCP S-1/GW-1 standards became effective on February 14, 2008; see 310 Code of Massachusetts Regulations (CMR) 40.0975(6)(1) (MADEP 2012). The MCP S-1/GW-1 standard for C_{19} through C_{36} aliphatic hydrocarbons has increased from 2,500 to 3,000 mg/kg. The MCP S-1/GW-1 standard for C_{11} through C_{22} aromatic hydrocarbons has increased from 200 to 1,000 mg/kg. The new MCP S-1/GW-1 standards do not change the protectiveness of the remedy.

Dieldrin – Dieldrin was identified as a COC in the CS-16/CS-17 ROD with a RAL of 0.035 mg/kg, which is based on the lowest of risk/hazard-equivalent concentrations for mammals and birds listed in Appendix F, Table F-2, of the MMR *Risk Assessment Handbook* (RAH) (Automated Sciences Group [ASG] 1994). The new surface soil RALs are based on the most stringent value of the following: (1) phytotoxicity critical soil concentration included in Appendix O, Table O-3, of the MMR RAH; (2) lowest of ecological risk-based concentrations for white-footed mouse, cardinal, and red fox included in Appendix F, Table F-2, of the MMR RAH; (3) Outside of the Flightline (i.e., residential) Tier I risk/hazard evaluation concentrations included in Appendix F, Table F-1, of the MMR RAH; and (4) the current MCP S-1/GW-1 standard (MADEP 2012). Table 3-1 shows the selection process and the resulting new surface soil RAL for dieldrin.

Polycyclic aromatic hydrocarbons (PAHs) – PAHs such as chrysene, fluoranthene, phenanthrene, and pyrene were not identified as COCs in the RODs, 2000 ESD, and 2003 ESD for any of the AOCs affected by this ESD. As a component of the selected remedy (i.e., to collect and analyze samples for SVOCs and inorganics) for AOC SD-3/FTA-3/CY-4, delineation soil samples were analyzed for PAHs and metals. The 2000 ESD removed the drainage swale from CS-2 and added it to AOC SD-5/FS-5 and also proposed soil sampling of the former CS-2 drainage ditch. Samples were to be analyzed for pesticides, PCBs, metals, and SVOCs. For delineation purposes, exceedances of ecological risk-based DSRP STCLs were to be considered COCs for SD-3/FTA-3/CY-4 and SD-5/FS-5. The ecological risk-based DSRP STCLs for chrysene, fluoranthene, phenanthrene, and pyrene were based on the lowest of risk/hazard-equivalent concentrations for mammals and birds listed in Appendix F, Table F-2, of the MMR RAH.

New surface soil RALs for chrysene, fluoranthene, phenanthrene, and pyrene are based on the most stringent value of the following: (1) phytotoxicity critical soil concentration included in Appendix O, Table O-3, of the MMR RAH; (2) lowest of ecological risk-based concentrations for white-footed mouse, cardinal, and red fox included in Appendix F, Table F-2, of the MMR RAH; (3) Outside of the Flightline (i.e., residential) Tier I risk/hazard evaluation concentrations included in Appendix F, Table F-1, of the MMR RAH; and (4) the current MCP S-1/GW-1

standard (MADEP 2012). Table 3-1 shows the selection process and the resulting new surface soil RALs for organic COCs.

Table 3-1 Selection process for new surface soil RALs for organic contaminants.

COC	Phytotoxicity Critical Concentration (mg/kg)	Lowest Ecological Risk (mg/kg)	Outside the Flightline Tier I (mg/kg)	MCP S-1/GW-1 (mg/kg)	2013 Surface Soil RALs (mg/kg)
Dieldrin	1.39	0.44	0.133	**0.05**	0.05
Chrysene	**7.82**	8.86	86.0	70.0	7.82
Fluoranthene	**7.26**	105	2,200	1,000	7.26
Phenanthrene	**4.16**	7.47	2,200	10	4.16
Pyrene	**7.08**	65.7	1,650	1,000	7.08
Bold = The most stringent value selected as the new surface soil RALs in this 2013 ESD.					

Table 3-2 summarizes new RALs for surface soil (0–2 ft bgs) for some COCs and for contaminants not considered COCs in the CS-16/CS-17 ROD and the Six-AOC ROD. Changes to a specific AOC are included in Subsection 4.1 of this ESD.

Table 3-2 Additional and revised RALs (0–2 ft bgs).

COC	ROD RAL (mg/kg)/Basis	2013 RAL (mg/kg)/Basis
Arsenic	3.6 (MMR background)	7.1 (Lowest ecological, mammal)
Cadmium	1.5 (MMR background)	1.8 (Lowest ecological, bird)
Chromium (total)	6.8 (MMR background)	19.0 (Camp Edwards/MMR background)
Copper	19.3 (Lowest ecological, bird)	61.0 (Ecological, invertebrates)

Lead	15.8 (Lowest ecological, bird)	99.0 (MADEP background)
Mercury, methyl	Not identified	0.18 (Lowest ecological, mammal)
Mercury, total	Not identified	10.0 (MADEP landfill reuse level)
Nickel	Not identified	20.0 (MCP S-1/GW-1 standard)
Vanadium	15.2 (MMR background)	47.0 (Lowest ecological, mammal)
Zinc	16.0 (MMR background)	68.0 (Lowest ecological, bird)
Dieldrin	Not identified	0.05 (Current MCP S-1/GW-1 standard)
Chrysene	Not identified	0.625 (Ecological, bird)
Fluoranthene	Not identified	7.81 (Ecological, bird)
Phenanthrene	Not identified	0.625 (Ecological, bird)
Pyrene	Not identified	4.69 (Ecological, bird)
TPH	500 (Outside the Flightline, MCP S-1/GW-1)	1,000 (Current MCP S-1/GW-1 standard)

Aliphatic Hydrocarbons		
C_5–C_8 Aliphatic hydrocarbons	Not identified	100 (Current MCP S-1/GW-1 standard)
C_9–C_{12} Aliphatic hydrocarbons	Not identified	1,000 (Current MCP S-1/GW-1 standard)
C_9–C_{18} Aliphatic hydrocarbons	Not identified	1,000 (Current MCP S-1/GW-1 standard)
C_{19}–C_{36} Aliphatic hydrocarbons	Not identified	3,000 (Current MCP S-1/GW-1 standard)
Aromatic Hydrocarbons		
C_9–C_{10} Aromatic hydrocarbons	Not identified	100 (Current MCP S-1/GW-1 standard)
C_{11}–C_{22} Aromatic hydrocarbons	Not identified	1,000 (Current MCP S-1/GW-1 standard)

3.2 Removal of the Potential Sediment Excavation Requirement from the Selected Remedy at SD-4

The remedy in the SD-4 ROD included the requirement for sampling and engineering controls to assess the contribution of sediment contaminants to surface-water contamination, the potential bioavailability and toxicity of pond sediments, and, if necessary, removal of source-area sediments exceeding cleanup criteria (ROD did not specify a cleanup level) and treatment of excavated material to reduce contaminant mobility in the area south of Reilly Road. The required sampling and evaluation was conducted between 2001 and 2003 and concluded that although there are levels of inorganic COPCs present in hydric soils in the wetland portion of SD-4, these levels are not likely to have a significant negative impact on the wetland plant and invertebrate communities, and wetland receptors (e.g. plants and terrestrial invertebrates) in SD-4 are not likely to be at risk from exposure to inorganic compounds in hydric soil at this site

(AFCEE 2003b). Additionally, the risk evaluation indicated that little to no significant potential risks to vertebrate wildlife are likely from exposure to COPCs in SD-4 hydric soil (AFCEE 2003d).

3.3 Removal of the Asphalt-Batching Component from the Selected Remedy of AOC SD-5/FS-5

The remedy presented in the SD-5/FS-5 ROD is excavation and onsite cold-mix asphalt batching of recyclable contaminated soils. The basis for removal of the asphalt-batching component from the SD-5/FS-5 remedy in this ESD is that the volume of contaminated soil from SD-5/FS-5 was less than previously estimated and resulted in a cost difference that favored offsite disposal.

3.4 Implementation of an SVE System to Treat TCE and PCE in Subsurface Soil at AOC SD-5 Detail A

Sampling was conducted between December 2000 and January 2001 at AOC SD-5 Detail A to determine the lateral and vertical extent of metals and VOC contamination to 4 ft bgs. Sampling was performed on a 50- × 50-ft grid pattern. Concentrations of TCE slightly above the STCL of 10 µg/kg were detected in grids DD21, EE21, and FF21. The highest concentration was 25.9 µg/kg detected in grid EE21 at a depth of 2 ft bgs. Because there were detections of TCE above the STCL, additional sampling was required to fully characterize the lateral and vertical extent of contamination at SD-5 Detail A.

Subsurface samples were collected from June 2001 through November 2001 to determine the vertical extent of chlorinated VOC contamination at SD-5 Detail A. Eight locations had detections above the leaching-based STCLs for PCE and TCE. Contamination is generally confined to grids AA19 and BB19 and between 6 and 20 ft bgs.

Because the depth of contamination was greater than expected, the method of remediation was reevaluated. Excavations to depths of 20 ft have sloping requirements that significantly increase the size of excavation. SVE treatment, however, treats the soil in place and is generally the presumptive remedy for subsurface VOC contamination. In this instance, SVE was found to be preferable, and AFCEE, in coordination with the EPA and MADEP, selected SVE as the method for treatment (AFCEE 2005b).

Results of the delineation sampling were used to design an SVE system. The optimized vapor extraction treatment system for the SD-5 site consisted of two extraction wells located at the center of the grids AA19 and BB19, with a 10-ft well screen in the vadose zone from 8 to 18 ft bgs. The system is an extension of the treatment system used at AOC FTA-2/LF-2. Appendix C of AFCEE (2005b) describes the operation and results of the SVE system at SD-5 which operated from 20 Aug 2002 to 14 August 2003 and removed approximately 5 pounds of VOCs.

3.5 Expansion of Offsite Disposal Options for Excavated Soil from AOC SD-5/FS-5 to Include RCRA Subtitle D Facilities

This ESD amends the offsite disposal component by providing flexibility for disposal of nonhazardous wastes (i.e., contaminated soil) from AOC SD-5/FS. Excavated soils from AOC SD-5/FS-5 were transported to and stockpiled at the Central Storage Area. Stockpile soil sampling was required to fulfill the waste characterization requirements for disposal at the landfill. Waste characterization efforts indicated that none of the contaminated soil excavated from AOC SD-5/FS-5 was a RCRA hazardous waste. Results, which are presented in Appendix I of AFCEE (2005b), were below RCRA TCLP levels.

Because the stockpiled AOC SD-5/FS-5 soil was already shipped as a nonhazardous material under a MADEP bill of lading to the Taunton Landfill in Taunton, Massachusetts, and the Thatcher Street Landfill in Brockton, Massachusetts, it is appropriate to expand offsite disposal options to include facilities permitted to accept only nonhazardous wastes (i.e., RCRA Subtitle D landfills).

4.0 DESCRIPTION OF SIGNIFICANT DIFFERENCES

This section describes the significant differences between the original selected remedy as presented in the applicable RODs and the two subsequent ESDs (2000 ESD and 2003 ESD) and the actions proposed in this ESD.

4.1 Establishment of New Surface Soil Remedial Action Levels

Table 4-1 presents a comparison of original (ROD RALs) and revised or new RALs for AOCs CS-16/CS-17, SD-3/FTA-3/CY-4, SD-4, and SD-5/FS-5 affected by this ESD. Table 4-1 separates the AOCs according to their respective RODs.

Table 4-1 Comparison of original (ROD RALs) and revised or new RALs for AOCs CS-16/CS-17, SD-3/FTA-3/CY-4, SD-4, and SD-5/FS-5 affected by this ESD.

COC	ROD RAL (mg/kg)	New RAL (mg/kg)
ROD AOC CS-16/CS-17		
Dieldrin	0.035	0.05
Mercury, mono-methyl	Not identified	0.18
Mercury, total	Not identified	10.0
ROD AOC SD-3/FTA-3/CY-4		
Chrysene	Not identified	0.625
Phenanthrene	Not identified	0.625
ROD AOC SD-4		
Arsenic	Not identified	7.1
Cadmium	Not identified	1.8
Chromium (total)	Not identified	19.0
Lead	Not identified	99.0
Nickel	Not identified	20.0 (MCP S-1/GW-1

		standard)
Vanadium	Not identified	47.0
C_5–C_8 Aliphatic hydrocarbons	1,200[a]	100
C_9–C_{12} Aliphatic hydrocarbons	1,200[a]	1,000
C_{13}–C_{18} Aliphatic hydrocarbons	1,200[a]	1,000
C_{19}–C_{36} Aliphatic hydrocarbons	1,200[a]	3,000
C_9–C_{10} Aromatic hydrocarbons	1,200[a]	100
C_{11}–C_{22} Aromatic hydrocarbons	1,200[a]	1,000
ROD AOC SD-5/FS-5		
Arsenic	Not identified	7.1
Chromium (total)	6.8	19.0
Copper	19.3	61.0
Lead	15.8	99.0
Mercury	1.48	10.0
Vanadium	Not identified	47.0
Zinc	16.0	68.0
Dieldrin	Not identified	0.05
Chrysene	Not identified	0.625
Fluoranthene	Not identified	7.81
Pyrene	Not identified	4.69
Phenanthrene	Not identified	0.625

TPH	Not identified	1,000
C_5–C_8 Aliphatic hydrocarbons	Not identified	100
C_9–C_{12} Aliphatic hydrocarbons	Not identified	1,000
C_{13}–C_{18} Aliphatic hydrocarbons	Not identified	1,000
C_{19}–C_{36} Aliphatic hydrocarbons	Not identified	3,000
C_9–C_{10} Aromatic hydrocarbons	Not identified	100
C_{11}–C_{22} Aromatic hydrocarbons	Not identified	1,000
a. Soil-only cleanup level based on inside-the-flightline TPH STCL. No cleanup levels were developed for sediment and surface water in the ROD for SD-4.		

4.2 Removal of the Potential Sediment Excavation Requirement from the Selected Remedy SD-4

The remedy presented in the SD-4 ROD included the requirement for sampling and engineering controls to assess the contribution of sediment contaminants to surface-water contamination, the potential bioavailability and toxicity of pond sediments, and, if necessary, removal of source-area sediments exceeding cleanup criteria (ROD did not specify a cleanup level) and treatment of excavated material to reduce contaminant mobility in the area south of Reilly Road. This ESD removes the requirement for potential sediment excavation south of Reilly Road because sampling and associated risk assessments indicate no unacceptable ecological risk.

4.3 Removal of the Asphalt-Batching Component from the Selected Remedy of AOC SD-5/FS-5

The remedy presented in the SD-5/FS-5 ROD is excavation and onsite cold-mix asphalt batching of recyclable contaminated soils and excavation and offsite disposal of nonrecyclable contaminated soils to be disposed of at a facility permitted to treat and/or dispose of RCRA hazardous waste. This ESD removes the asphalt-batching component from the SD-5/FS-5 remedy, because contaminated soil from SD-5/FS-5 was not amenable for asphalt batching (i.e., nonrecyclable).

4.4 Implementation of an SVE System to Treat TCE and PCE in Subsurface Soil at AOC SD-5 Detail A

The results of subsurface samples collected from June 2001 through November 2001 to determine the vertical extent of chlorinated VOC contamination at SD-5 Detail A concluded that the depth of contamination was greater than expected, and the method of remediation was reevaluated. Excavations to depths of 20 ft have sloping requirements that significantly increase the size of excavation. SVE treatment, however, treats the soil in place and is generally the presumptive remedy for subsurface VOC contamination. In this instance, SVE was found to be preferable, and AFCEE, in coordination with the EPA and MADEP, selected SVE as the method for treatment (AFCEE 2005b). Therefore, this ESD documents the implementation of the SVE system to treat TCE and PCE in subsurface soil at AOC SD-5 Detail A.

4.5 Expansion of Offsite Disposal Options for Excavated Soil from AOC SD-5/FS-5 to Include RCRA Subtitle D Facilities

This ESD amends the offsite disposal component by providing flexibility for disposal of nonhazardous wastes (i.e., contaminated soil) from AOC SD-5/FS-5. Waste characterization efforts indicated that none of the contaminated soil excavated from AOC SD-5/FS-5 was a RCRA hazardous waste. Because the stockpiled AOC SD-5/FS-5 soil was already shipped as a nonhazardous material under a MADEP bill of lading to the Taunton Landfill in Taunton, Massachusetts, and the Thatcher Street Landfill in Brockton, Massachusetts, it is appropriate to expand offsite disposal options to include facilities permitted to accept only nonhazardous wastes (i.e., RCRA Subtitle D landfills).

5.0 STATUTORY DETERMINATION

This ESD modifies multiple remedies for several sites and is consistent with CERCLA §121 and, to the extent practicable, the NCP. The modifications:

- Are protective of human health and the environment
- Comply with federal and Commonwealth of Massachusetts requirements that are legally applicable or relevant and appropriate to the remedial action and that are cost-effective
- Are the result of successfully implementing remedial actions using permanent solutions and alternative treatment technologies to the maximum extent practicable
- Reduce administrative costs and unnecessary regulatory burden.

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APPENDIX A

MassDEP Concurrence Letter

MassDEP
Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection
One Winter Street Boston, MA 02108 • 617-292-5500

DEVAL L. PATRICK
Governor

TIMOTHY P. MURRAY
Lieutenant Governor

RICHARD K. SULLIVAN JR.
Secretary

KENNETH L. KIMMELL
Commissioner

September 30, 2013

James T. Owens III, Director
Office of Site Remediation and Restoration
U.S. Environmental Protection Agency, Region I
5 Post Office Square, Suite 100
Boston, MA 02109-3912

RE: **BOURNE**
Release Tracking Number: 4-0000037
Joint Base Cape Cod (JBCC)
Explanation of Significant Differences, Areas of Contamination CS-16/CS-17, SD-3/FTA-3/CY-4, SD-4, and SD-5/FS-5, Concurrence

Dear Mr. Owens:

The Massachusetts Department of Environmental Protection (MassDEP) has reviewed the document entitled **"Explanation of Significant Differences, Areas of Contamination CS-16/CS-17, SD-3/FTA-3/CY-4, SD-4, and SD-5/FS-5"** (the ESD), dated August 2013. The ESD was prepared by the Air Force Civil Engineer Center (AFCEC) (formerly Air Force Center for Engineering and the Environment (AFCEE)) at the Joint Base Cape Cod (JBCC) - (formerly the Massachusetts Military Reservation (MMR)) in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The ESD was prepared to document changes to the language in the decision documents for the following Installation Restoration Program (IRP) Areas of Contamination (AOCs): Chemical Spill (CS)-16,CS-17, Storm Drainage (SD)-3, Fire Training Area (FTA)-3, Coal Yard (CY)-4, SD-4, SD-5, and Fuel Spill (FS)-5.

The ESD amends the following two Records of Decision (ROD)s: *Massachusetts Military Reservation, Record of Decision Area of Contamination CS-16/CS-17 Source Areas, Final, May 1999 (CS-16/CS-17 ROD); and Massachusetts Military Reservation, Record of Decision Area of Contamination FTA-2/LF-2, PFSA/FS-10/FS-11, SD-2/FS-6/FS-8, SD-3/FTA-3/CY-4, SD-4, and SD-5/FS-5 Source Areas, Final September 1998 (6 AOC ROD).* These two RODs were amended by one of the following two previous ESDs: *Explanation of Significant Differences to the Final Record of Decision, Areas of Contamination FTA-2/LF-2, PFSA/FS-10/FS-22, SD-2/FS-6/FS-8, SD-3/FTA-3/CY-4, SD4, and SD-5/FS-5 Source Areas, Final, October 2000 (the 2000 ESD)*; and *Explanation of Significant Differences Areas of Contamination, CS-10 (A, B & E), CS16/CS-l7, FS-9, SD-2/FS-6/FS-8, and SD-3/FTA-3/CY-4, Final, January 2003 (the 2003 ESD).*

AOC CS-16/CS-17 is an 80 acre site located at the JBCC waste water treatment facility along the southern boundary of the Cantonment Area and is located within the town of Sandwich, near the intersection of the Falmouth-Mashpee town lines. The Remedial Investigation was completed in 1991. Chlorinated solvents, polychlorinated biphenyls (PCBs), pesticides, and heavy metals were found in the active and inactive sludge drying beds and the former sewage sludge disposal area above risk based concentrations. The selected remedy for CS-16/CS-17 included excavation, onsite cold-mix asphalt

batching of recyclable contaminated soil, and offsite disposal of non-recyclable contaminated soil. The remedial action was completed in 2002 and Remedial Action Report (RAR) was finalized in April 2003.

The 2003 ESD made three changes to the selected remedy presented in the CS-16/CS-17 ROD:

- Establishment of Remedial Action Levels for certain inorganic chemicals and petroleum hydrocarbons to replace cleanup levels in the ROD;
- Removal of the asphalt-batching component from the selected remedy; and
- Expansion of off-site disposal options to include RCRA Subtitle D facilities.

This ESD proposes to change the dieldrin Remedial Action Level (RAL) from 0.035 mg/kg to 0.050 mg/kg and add mono-methyl mercury and total mercury as Contaminants of Concern (COCs) for CS-16/CS-17.

AOC SD-3/FTA-3/CY-4 is located near the southeastern border of the JBCC on the eastern side of the runways, covering approximately 30 acres. The Remedial Investigation was completed in 1993. The selected remedy is confirmatory soil sampling with a contingency for excavation and asphalt batching. The Remedial Action Report (RAR) was finalized in August 2004.

The 2003 ESD made the following changes to the selected remedy for AOC SD-3/FTA-3/CY-4 presented in the 6 AOC ROD:

- Establishment of new ecological risk-based cleanup-levels for inorganic chemicals and PCBs;
- Removal of the asphalt-batching component from the selected remedy; and
- Expansion of offsite disposal options to include RCRA Subtitle D facilities.

This ESD adds chrysene and phenanthrene as COCs for AOC SD-3/FTA-3/CY-4.

AOC SD-4 is a wooded drainage basin located in the southeastern section of JBCC. The Remedial Investigation was completed in 1996. The selected remedy was excavation and asphalt batching. This ESD changes the petroleum hydrocarbons RAL for AOC SD-4. The MCP Method 1 S-1/GW-1 standards for total petroleum hydrocarbon and aliphatic and aromatic hydrocarbons are used as the new RALs.

AOC SD-5/FS-5 is located in the central part of the JBCC Cantonment Area. The Remedial Investigation was completed in 1993. Primary COCs in soil were chlorinated solvents, petroleum hydrocarbons, and metals. The selected remedy is excavation, onsite cold-mix asphalt batching of recyclable contaminated soils, and offsite disposal of non-recyclable contaminated soils at a facility permitted to treat and/or dispose of RCRA hazardous waste. The SD-5/FS-5 RAR was completed in September 2005. The 2000 ESD modifies the 6 AOC ROD by removing a drainage swale from the CS-2 Study Area and adds it to AOC SD-5.

This ESD makes the following changes to the selected remedy for AOC SD-5 presented in the ROD:

- Establishment of new ecological risk-based RALs for chromium, copper, lead, mercury, and zinc;
- Establishment of ecological and residential risk based cleanup levels for contaminants (vanadium, dieldrin, chrysene, fluoranthene, pyrene, and phenanthrene) not considered COCs in the 6 AOC ROD;
- Establishment of current residential cleanup standards (MCP S-1/GW-1 Standards) for total petroleum hydrocarbon and aliphatic and aromatic hydrocarbons;
- Removal of onsite cold-mix asphalt batching component from the selected remedy;
- Implementation of a soil vapor extraction (SVE) system to treat trichloroethylene (TCE) and

tetrachloroethylene (PCE) in subsurface soil at SD-5 Detail A; and
- Expansion of offsite disposal options to include RCRA Subtitle D facilities.

MassDEP concurs with the ESD. The remedies ensure a sufficient and protective level of control such that none of the contamination will present a significant risk of harm to health, safety, public welfare or the environment during any foreseeable period of time.

MassDEP's concurrence with the ESD is based upon representations made to MassDEP by AFCEC and assumes that all information provided is substantially complete and accurate. Without limitation, if MassDEP determines that any material omissions or misstatements exist, if new information becomes available, if Land Use Controls (LUCs) are not properly implemented, monitored and/or maintained or if conditions within any of the AOCs change, resulting in potential or actual human exposure or threats to the environment, MassDEP reserves its authority under M.G.L. c. 21E, CERCLA, the MCP, the NCP and any other applicable law or regulation to require further response actions at IRP AOCs CS-16/CS-17, SD-3/FTA-3/CY-4, SD-4, and SD-5/FS-5 including, without limitation, additional investigation, remedial measures, and the implementation of LUCs. MassDEP will review relevant information as it becomes available to determine if additional investigative and/or remedial measures are necessary for the protection of public health, safety, welfare or the environment at IRP AOCs CS-16/CS-17, SD-3/FTA-3/CY-4, SD-4, and SD-5/FS-5. This includes, without limitation, new regulatory requirements or changes in the environmental conditions at IRP AOCs CS-16/CS-17, SD-3/FTA-3/CY-4, SD-4, and SD-5/FS-5.

Please incorporate this letter into the Administrative Record for IRP AOCs CS-16/CS-17, SD-3/FTA-3/CY-4, SD-4, and SD-5/FS-5. If you have any questions regarding this matter, please contact Leonard J. Pinaud, Chief, State & Federal Site Management Section, at (508) 946-2871 or Millie Garcia-Serrano, Deputy Regional Director of the Bureau of Waste Site Cleanup at (508) 946-2727.

Sincerely,

Benjamin J. Ericson
Assistant Commissioner
Bureau of Waste Site Cleanup

L/LP/

4-0000037 Multi-AOC Source ESD Concurrence Letter 09-2013

ec: Philip Weinberg, Regional Director
Millie Garcia-Serrano, Deputy Regional Director
Leonard J. Pinaud, Chief, State & Federal Site Management
Dawn Stolfi Stalenhoef, Regional Counsel
Mark Begley, Environmental Management Commission
MassDEP Southeast Region
MMR Senior Management Board
MMR Plume Cleanup Team
Upper Cape Boards of Selectmen
Upper Cape Boards of Health